

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 | 1. (Currently amended) A computer program product-method for
2 | computing interval parameter bounds from fallible measurements, comprising:
3 | receiving a set of measurements z_1, \dots, z_n , wherein an observation model
4 | describes each z_i as a function of a p -element vector parameter $\mathbf{x} = (x_1, \dots, x_p)$,
5 | wherein receiving the set of measurements involves
6 | receiving values for a set of conditions c_1, \dots, c_n under which the
7 | corresponding observations z_i were made,
8 | wherein equations in the system of nonlinear equations
9 | account for the conditions c_i and are of the form $z_i - h(\mathbf{x} | c_i) = 0$
10 | ($i=1, \dots, n$), and
11 | wherein each condition c_i is not known precisely but is
12 | contained within an interval c_i^l ;
13 | storing the set of measurements z_1, \dots, z_n in a memory in a computer
14 | system;
15 | forming a system of nonlinear equations $z_i - h(\mathbf{x}) = 0$ ($i=1, \dots, n$) based on
16 | the observation model; and
17 | solving the system of nonlinear equations to determine interval parameter
18 | bounds on \mathbf{x} .

1 | 2. (Currently amended) The computer program product-method of claim 1,
2 | wherein the system of nonlinear equations is an “overdetermined system” in
3 | which there are more equations than unknowns.

1 | 3. (Currently amended) The computer program product-method of claim 1,
2 | wherein each measurement z_i is actually a q -element vector of measurements $\mathbf{z}_i =$
3 | $(z_{i1}, \dots, z_{iq})^T$, and h is actually a q -element vector of functions $\mathbf{h} = (h_1, \dots, h_q)^T$.

1 | 4 (Canceled).

1 | 5. (Currently amended) The computer program product-method of claim 1
2 | claim 4, wherein each condition c_i is actually an r -element vector of conditions \mathbf{c}_i
3 | $= (c_{i1}, \dots, c_{ir})^T$.

1 | 6 (Canceled).

1 | 7. (Currently amended) The computer program product-method of claim 1
2 | claim 4, wherein equations in the system of nonlinear equations are of the form z_i
3 | $- h(\mathbf{x} | c_i) + \varepsilon^1(\mathbf{x}, c_i) = 0$ ($i=1, \dots, n$), which includes an error model $\varepsilon^1(\mathbf{x}, c_i)$ that
4 | provides interval bounds on measurement errors for z_i .

1 | 8. (Currently amended) The computer program product-method of claim 7,
2 | wherein if z_i is actually a q -element vector of measurements $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$, then
3 | ε^1 is actually a q -element vector $\boldsymbol{\varepsilon}^1 = (\varepsilon_1, \dots, \varepsilon_q)^T$.

1 | 9. (Currently amended) The computer program product-method of claim 7,
2 | wherein if there exists no solution to the system of nonlinear equations, the
3 | method further comprises determining that at least one of the following is true:

4 at least one of the set of measurements z_1, \dots, z_n is faulty;
5 the observation model $h(\mathbf{x} | c_i)$ is false;
6 the error model $\varepsilon^l(\mathbf{x}, c_i)$ is false; and
7 the computational system used to compute interval bounds on elements of
8 \mathbf{x} is flawed.

1 | 10. (Currently amended) The computer program product ~~method~~ of claim
2 | 1, wherein solving the system of nonlinear equations involves:
3 | linearizing the system of nonlinear equations to form a corresponding
4 | system of linear equations; and
5 | solving the system of linear equations.

1 | 11. (Currently amended) The computer program product ~~method~~ of claim
2 | 10, wherein solving the system of nonlinear equations involves using Gaussian
3 | Elimination.

1 | 12. (Currently amended) A computer-readable storage medium storing
2 | instructions that when executed by a computer cause the computer to perform a
3 | method for computing interval parameter bounds from fallible measurements,
4 | wherein the computer-readable storage medium includes magnetic storage
5 | devices, optical storage devices, disk drives, magnetic tape, CDs (compact discs),
6 | and DVDs (digital versatile discs or digital video discs), the method comprising:
7 | receiving a set of measurements z_1, \dots, z_n , wherein an observation model
8 | describes each z_i as a function of a p -element vector parameter $\mathbf{x} = (x_1, \dots, x_p)$,
9 | wherein receiving the set of measurements involves
10 | receiving values for a set of conditions c_1, \dots, c_n under which the
11 | corresponding observations z_i were made,

12 wherein equations in the system of nonlinear equations
13 account for the conditions c_i and are of the form $z_i - h(\mathbf{x} | c_i) = 0$
14 $(i=1, \dots, n)$, and
15 wherein each condition c_i is not known precisely but is
16 contained within an interval c_i^l ;
17 storing the set of measurements z_1, \dots, z_n in a memory in a computer
18 system;
19 forming a system of nonlinear equations $z_i - h(\mathbf{x}) = 0$ ($i=1, \dots, n$) based on
20 the observation model; and
21 solving the system of nonlinear equations to determine interval parameter
22 bounds on \mathbf{x} .

1 13. (Original) The computer-readable storage medium of claim 12,
2 wherein the system of nonlinear equations is an “overdetermined system” in
3 which there are more equations than unknowns.

1 14. (Original) The computer-readable storage medium of claim 12,
2 wherein each measurement z_i is actually a q -element vector of measurements $\mathbf{z}_i =$
3 $(z_{i1}, \dots, z_{iq})^T$, and h is actually a q -element vector of functions $\mathbf{h} = (h_1, \dots, h_q)^T$.

1 15 (Canceled).

1 16. (Currently amended) The computer-readable storage medium of claim
2 12-claim 15, wherein each condition c_i is actually an r -element vector of
3 conditions $\mathbf{c}_i = (c_{i1}, \dots, c_{ir})^T$.

1 17 (Canceled).

1 | 18. (Currently amended) The computer-readable storage medium of claim
2 | 12-claim 15, wherein equations in the system of nonlinear equations are of the
3 | form,
4 | $z_i - h(\mathbf{x} | c_i) + \varepsilon^l(\mathbf{x}, c_i) = 0$ ($i=1, \dots, n$), which includes an error model $\varepsilon^l(\mathbf{x}, c_i)$ that
5 | provides interval bounds on measurement errors for z_i .

1 | 19. (Original) The computer-readable storage medium of claim 18,
2 | wherein if z_i is actually a q -element vector of measurements $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$, then
3 | ε^l is actually a q -element vector $\varepsilon^l = (\varepsilon_1, \dots, \varepsilon_q)^T$.

1 | 20. (Original) The computer-readable storage medium of claim 18,
2 | wherein if there exists no solution to the system of nonlinear equations, the
3 | method further comprises determining that at least one of the following is true:
4 | at least one of the set of measurements z_1, \dots, z_n is faulty;
5 | the observation model $h(\mathbf{x} | c_i)$ is false;
6 | the error model $\varepsilon^l(\mathbf{x}, c_i)$ is false; and
7 | the computational system used to compute interval bounds on elements of
8 | \mathbf{x} is flawed.

1 | 21. (Original) The computer-readable storage medium of claim 12,
2 | wherein solving the system of nonlinear equations involves:
3 | linearizing the system of nonlinear equations to form a corresponding
4 | system of linear equations; and
5 | solving the system of linear equations.

1 | 22. (Original) The computer-readable storage medium of claim 21,
2 | wherein solving the system of nonlinear equations involves using Gaussian
3 | Elimination.

1 23. (Currently amended) An apparatus that computes interval parameter
 2 bounds from fallible measurements, comprising:
 3 a receiving mechanism configured to receive a set of measurements
 4 z_1, \dots, z_n , wherein an observation model describes each z_i as a function of a
 5 p -element vector parameter $\mathbf{x} = (x_1, \dots, x_p)$,
 6 wherein receiving the set of measurements involves
 7 receiving values for a set of conditions c_1, \dots, c_n under which the
 8 corresponding observations z_i were made,
 9 wherein equations in the system of nonlinear equations
 10 account for the conditions c_i and are of the form $z_i - h(\mathbf{x} | c_i) = 0$
 11 $(i=1, \dots, n)$, and
 12 wherein each condition c_i is not known precisely but is
 13 contained within an interval c_i^l ;
 14 a memory in a computer system for storing the set of measurements
 15 z_1, \dots, z_n ;
 16 an equation forming mechanism configured to form a system of nonlinear
 17 equations $z_i - h(\mathbf{x}) = 0$ ($i=1, \dots, n$) based on the observation model; and
 18 a solver configured to solve the system of nonlinear equations to determine
 19 interval parameter bounds on \mathbf{x} .

1 24. (Original) The apparatus of claim 23, wherein the system of nonlinear
 2 equations is an “overdetermined system” in which there are more equations than
 3 unknowns.

1 25. (Original) The apparatus of claim 23, wherein each measurement z_i is
 2 actually a q -element vector of measurements $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$, and h is actually a
 3 q -element vector of functions $\mathbf{h} = (h_1, \dots, h_q)^T$.

1 26 (Canceled).

1 27. (Currently amended) The apparatus of claim 23 ~~claim 26~~, wherein each
2 condition c_i is actually an r -element vector of conditions $\mathbf{c}_i = (c_{i1}, \dots, c_{ir})^T$.

1 28 (Canceled).

1 29. (Currently amended) The apparatus of claim 23 ~~claim 26~~, wherein
2 equations in the system of nonlinear equations are of the form $z_i - h(\mathbf{x} \mid c_i) + \varepsilon^l(\mathbf{x},$
3 $c_i) = 0$ ($i=1, \dots, n$), which includes an error model $\varepsilon^l(\mathbf{x}, c_i)$ that provides interval
4 bounds on measurement errors for z_i .

1 30. (Original) The apparatus of claim 29, wherein if z_i is actually a q -
2 element vector of measurements $\mathbf{z}_i = (z_{i1}, \dots, z_{iq})^T$, then ε^l is actually a q -element
3 vector $\boldsymbol{\varepsilon}^l = (\varepsilon_1, \dots, \varepsilon_q)^T$.

1 31. (Original) The apparatus of claim 29, wherein if there exists no
2 solution to the system of nonlinear equations, the solver is configured to
3 determine that at least one of the following is true:
4 at least one of the set of measurements z_i, \dots, z_n is faulty;
5 the observation model $h(\mathbf{x} \mid c_i)$ is false;
6 the error model $\varepsilon^l(\mathbf{x}, c_i)$ is false; and
7 the computational system used to compute interval bounds on elements of
8 \mathbf{x} is flawed.

1 32. (Original) The apparatus of claim 23, wherein the solver is configured
2 to:

3 linearize the system of nonlinear equations to form a corresponding system
4 of linear equations; and to
5 solve the system of linear equations.

1 33. (Original) The apparatus of claim 32, wherein the solver is configured
2 to solve the system of nonlinear equations using Gaussian Elimination.